

Application No.: 10/615,622
Amendment Dated August 7, 2007
Reply to Office Action of June 7, 2007

MICR-151US

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) A method of making a camera module, comprising: providing a sensor housing comprising an image sensor, a lens holder comprising a lens, and a deformable focus adjustment structure; and permanently deforming the focus adjustment structure by heating the focus adjustment structure to move the lens to focus light onto the image sensor.
2. (Original) The method of claim 1, wherein the focus adjustment structure comprises a material shrinkable in response to energy, and deforming the focus adjustment structure comprises applying energy to at least some of the shrinkable material.
3. (Original) The method of claim 2, wherein the focus adjustment structure comprises heat shrink material, and deforming the focus adjustment structure comprises heating at least some of the heat shrink material.
4. (Original) The method of claim 3, wherein at least some of the heat shrink material is heated by contact with a heating element.
5. (Original) The method of claim 3, wherein at least some of the heat shrink material is heated by radiant energy.
6. (Original) The method of claim 5, wherein at least some of the heat shrink material is heated by laser energy.
7. (Original) The method of claim 2 wherein the shrinkable material is disposed uniformly about an optical axis of the lens.
8. (Original) The method of claim 7, wherein energy is applied uniformly to the uniformly disposed shrinkable material to reduce a distance separating the lens and the image sensor.
9. (Original) The method of claim 7, wherein energy is applied asymmetrically to the uniformly disposed shrinkable material to adjust where the optical axis intersects the image sensor.
10. (Original) The method of claim 2, further comprising guiding the lens holder while applying energy to at least some of the shrinkable material.
11. (Original) The method of claim 1, wherein the lens holder is a monolithic structure.

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12. (Original) The method of claim 1, wherein the lens holder and the sensor housing are formed as a single molding of thermoplastic material.

13. (Currently Amended) A system for making a camera module, comprising:
a camera module holder operable to hold a camera module comprising an image sensor disposed within a sensor housing and a lens holder attached to the sensor housing, the lens holder comprising a lens and a deformable focus adjustment structure; and
a focus adjuster operable to permanently deform the focus adjustment structure by heating the focus adjustment structure such that the focus adjuster moves to move the lens whereby to focus light is focused onto the image sensor.

14. (Original) The system of claim 13, wherein the focus adjustment structure comprises a material shrinkable in response to energy, and the focus adjuster is operable to apply energy to at least some of the shrinkable material.

15. (Original) The system of claim 14, wherein the focus adjustment structure comprises heat shrink material, and the focus adjuster is operable to heat at least some of the heat shrink material.

16. (Original) The system of claim 15, wherein the focus adjuster comprises a heating element operable for heating at least some of the heat shrink material.

17. (Original) The system of claim 15, wherein the focus adjuster comprises a radiant energy source for heating at least some of the heat shrink material.

18. (Original) The system of claim 17, wherein the focus adjuster comprises a laser for heating at least some of the heat shrink material with laser energy.

19. (Original) The system of claim 14 wherein the shrinkable material is disposed uniformly about an optical axis of the lens and the focus adjuster is operable to uniformly apply energy to the uniformly disposed shrinkable material to reduce a distance separating the lens and the image sensor.

20. (Original) The system of claim 14 wherein the shrinkable material is disposed uniformly about an optical axis of the lens and the focus adjuster is operable to asymmetrically apply energy to the uniformly disposed shrinkable material to adjust where the optical axis crosses the image sensor.

21. (Currently Amended) A camera module, comprising:
an image sensor disposed within a sensor housing;
a lens holder comprising a lens; and

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a focus adjustment structure disposed between the lens holder and the sensor housing, wherein the focus adjustment structure is deformed by heating the focus adjustment structure until light passing through the lens is focused onto the image sensor.

22. (Original) The camera module of claim 21, wherein the lens holder and the focus adjustment structure are sections of a monolithic structure, the lens holder and the focus adjustment structure comprising regions of material with similar chemical compositions but different internal structural arrangements.

23. (Original) The camera module of claim 22, wherein at least one region of the focus adjustment structure corresponds to a deformed version of a region of the lens holder.

24. (Original) The camera module of claim 22, wherein the at least one region of the focus adjustment structure corresponds to a heat shrunk version of a heat shrinkable region of the lens holder.

25. (Original) The camera module of claim 22, wherein the monolithic structure is formed of a thermoplastic material and the focus adjustment structure and the lens holder are characterized by different respective cross-linking densities.

26. (Original) The camera module of claim 21, wherein the lens holder comprises an exterior deformation inhibiting layer and the focus adjustment structure is free of any exterior deformation inhibiting layer.

27. (Original) The camera module of claim 26, wherein the exterior deformation inhibiting layer is substantially thermally conductive.

28. (Original) The camera module of claim 26, wherein the exterior deformation inhibiting layer is substantially reflective of radiation capable of deforming at least some regions of the lens holder.

29. (Original) The camera module of claim 21, wherein the lens holder, the focus adjustment structure, and the sensor housing are formed as a single molding of thermoplastic material.